UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/524,388	09/07/2005	Chandur Sadarangani	047935/288415	6041

826 7590 06/22/2009

ALSTON & BIRD LLP
BANK OF AMERICA PLAZA
101 SOUTH TRYON STREET, SUITE 4000
CHARLOTTE, NC 28280-4000

EXAMINER	
MOK, ALEX W	

ART UNIT	PAPER NUMBER
2834	

MAIL DATE	DELIVERY MODE
06/22/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/524,388	SADARANGANI ET AL.	
	Examiner	Art Unit	
	ALEX W. MOK	2834	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 June 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21 and 23-29* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-21 and 23-29* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 6/8/09 has been entered.

Claim Objections

2. Claim 27 is objected to because of the following informalities: claim 27 has been incorrectly identified as "currently amended" as filed on 6/8/09, as this should have been identified as "previously presented". Appropriate correction is required.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1, 2, 8-21, and 23-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sadarangani et al. (PCT Document No.: WO 01/78219), and further

in view of Kaneda et al. (US Patent Application Pub. No.: US 2002/0180295 A1) and Kober (US Patent No.: 3334254).

For claim 1, Sadarangani et al. teach an electrical machine comprising a stator comprising a plurality of stator elements (see figure 3) with magnetic flux conductors (reference numeral 3') and an electric conductor forming a winding (reference numeral 6a) extending in a winding path through each magnetic flux conductor, and a movable element (reference numeral 10) which comprises a number of permanent-magnet members (reference numeral 12') and which is movable in relation to the stator along a movement path, wherein the movable element is adapted to carry out a reciprocating motion (see page 18, lines 11-14), wherein the winding path comprises a first current-carrying section (reference numeral 6a) extending along the movement path, wherein each magnetic flux conductor is adapted to form, together with one of said permanent-magnet members, a closed magnetic flux circuit extending around said current-carrying section (see figure 3), wherein each permanent-magnet member comprises a primary magnet that has a north pole and a south pole and a magnetic direction extending from the south pole to the north pole and essentially across the movement path (see figure 3), and wherein the permanent-magnet members are arranged in an alternating order in the movable element with respect to the magnetic direction of the primary magnet (see figure 3), characterized in that adjacent permanent-magnet members of the movable element are separated from each other by an intermediate member (reference numeral 13). Sadarangani et al. do not teach the intermediate member having at least one secondary magnet having a magnetic direction going across the magnetic direction of

the primary magnet, wherein magnetic fields of adjacent permanent-magnet members and their secondary magnets are operable to mutually repel for essentially avoiding flux fringing in respect of the stator.

Kaneda et al. teach a rotor (see figure 7B), i.e. movable element, having magnet blocks which can constitute the primary magnet (whose arrows point toward/away from the center of rotation) and the secondary magnet of the intermediate member (arrows pointing along the circumferential direction). Kober discloses an electric machine where permanent magnets (reference numeral 1, figure 2) are magnetized in the radial direction (i.e. primary magnet), while the magnets (reference numeral 9) are magnetized in the circumferential direction oriented to oppose the leakage flux associated with the magnets (reference numeral 1).

It would have been obvious to have the magnetic direction extend across the direction of the primary magnet for the secondary magnets of the intermediate member, since the invention of Kaneda et al. is an electrical machine with permanent magnets, the same technological field as the claimed invention, and the invention of Kober is used for counteracting flux losses along the leakage paths (see column 1, lines 17-19), and the magnetic fields produced by the first oriented and second oriented magnets would naturally repel as the similar poles of the magnets in figure 2 of Kober are beside each other. A person of ordinary skill would have been able to apply these techniques of both Kaneda et al. and Kober in the invention of Sadarangani et al. as these techniques would reduce the magnetic flux leakage between adjacent permanent magnets and would avoid fringing with respect to the stator.

For claim 2, Sadarangani et al. disclose the claimed invention except for the magnetic direction of the secondary magnet extending parallel to the movement path. Kaneda et al. illustrate the magnetic direction of the secondary magnet going across the magnetic direction of the primary magnet (see figure 7B), and the magnetic direction of the secondary magnet would extend parallel to the movement path of the movable element when in combination with the invention of Sadarangani et al. This configuration would have been obvious for the same reasons given above for claim 1.

For claim 8, Sadarangani et al. disclose the claimed invention except for the magnetic direction of the secondary magnet being essentially perpendicular in relation to the magnetic direction of the primary magnets. Kaneda et al. illustrate the magnetic direction of the secondary magnet being perpendicular to the magnetic direction of the primary magnet (see figure 7B). This configuration for the magnetic direction would have been obvious for the reasons given above for claim 1.

For claim 9, Sadarangani et al. disclose the magnetic flux circuit having a magnetic flux that is parallel to a plane perpendicular to the movement path (see page 18, claim 2).

For claim 10, Sadarangani et al. disclose the distance between the centre of adjacent permanent magnet members being essentially equal to the distance between the centre of adjacent magnetic flux conductors of the stator (see page 18, claim 3).

For claim 11, Sadarangani et al. disclose the magnetic flux conductors of the stator being arranged in an alternating order with respect to the direction of the

magnetic flux in relation to the permanent magnet members in the respective magnetic flux circuit (see page 18, lines 22-25).

For claim 12, Sadarangani et al. disclose the essentially closed winding path having a second current carrying section extending parallel to the movement path (see page 19, lines 35+).

For claim 13, Sadarangani et al. disclose the first current carrying section of the winding path being associated with the first half of the magnetic flux conductors of the stator and the second current-carrying section of the winding path being associated with the second half of the magnetic flux conductors of the stator (page 20, lines 8-14).

For claim 14, Sadarangani et al. disclose the permanent magnet members of the movable element being adapted to cooperate with the magnetic flux conductors of the stator which are associated with the first current carrying section, and the magnetic flux conductors of the stator which are associated with the second current carrying section (page 20, lines 16-24).

For claim 15, the invention of Sadarangani et al. anticipates the magnetic flux conducting sections of each magnetic flux conductor being arranged in a line one after the other which is parallel to the movement path, and the magnetic flux in each conductor being extended in the same direction, since this constitutes the magnetic flux conductors being arranged in such a manner that the direction of the magnetic flux in relation to the winding is the same in each magnetic circuit as disclosed in Sadarangani et al. (see page 19, lines 8-12). Sadarangani et al. also disclose the adjacent magnetic flux conductors being separated by an intermediate element (see page 21, lines 4-8),

i.e. dividing member, but does not disclose the dividing member being made of magnetically conducting material. It would have been obvious to have this sort of material, since a person of ordinary skill in the art would have been able to select this known material for its suitability in the invention.

For claims 16 and 17, Sadarangani et al. disclose the claimed invention except for the sections forming a magnetic flux-conducting central section, and each of the magnetic flux conductor comprising at least the central section and two magnetic flux-conducting end sections. Since Sadarangani et al. anticipate the magnetic flux conducting sections as explained for claim 15, it would have been obvious to have these sections form a central section and end sections as recited in claims 16 and 17 since this would involve a rearrangement of parts which has been held to be a routine skill in the art. *In re Japikse*, 86 USPQ 70.

For claim 18, Sadarangani et al. disclose the intermediate element (i.e. dividing member) being magnetically isolating (see page 21, lines 7-8), i.e. magnetically insulating.

For claim 19, Sadarangani et al. disclose the claimed invention except for each dividing member forming a space with air along the end sections. It would have been obvious to have the dividing member form a space with air along the end sections, since this would involve a change in the shape of a component, and this particular configuration is just one of numerous configurations a person of ordinary skill in the art would find obvious for the purpose of providing magnetic insulation. *In re Dailey* 149 USPQ 47, 50 (CCPA 1966). See also Glue Co. v. Upton 97 US 3,24 (USSC 1878).

For claim 20, Sadarangani et al. disclose the claimed invention except for the dividing member being made of a magnetically conducting iron. It would have been obvious to have this configuration, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

For claim 21, Sadarangani et al. already anticipate the magnetic flux conducting section being arranged in a line one after the other parallel to the movement path as explained for claim 15, and this configuration would make the plane of these sections be disposed perpendicularly to the movement path.

For claim 23, Sadarangani et al. disclose the movable element connected to one piston that is movably arranged in a housing (see page 19, lines 25-27).

For claim 24, the housing of Sadarangani et al. (reference numerals 22, 23) can be used as a combustion chamber where the piston (reference numerals 20, 21) can move back and forth, and it would have been within the knowledge of a person skilled in the art to enable the electrical machine disclosed by the references of Sadarangani et al. and Kaneda et al. to cooperate with any type of engine, i.e. a combustion engine.

For claim 25, Sadarangani et al. disclose that the movement path can be curved (see page 17, lines 11-13), i.e. the movable element can carry out a rotating movement.

For claims 26 and 27, since the structural limitations of the electrical machine are disclosed by the inventions of Sadarangani et al. and Kaneda et al. as explained for claim 1, this would enable the machine to be used as a generator for generating electric

power, including generators that are adapted to constitute a component in a wind power plant or a wave power plant.

For claims 28 and 29, since the structural limitations of the electrical machine are disclosed by the inventions of Sadarangani et al. and Kaneda et al. as explained for claim 1, this would enable the machine to be used as a motor for generating mechanical power, including motors that are adapted to form a drive motor in a vehicle.

5. Claims 3, 4, 6, and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sadarangani et al., Kaneda et al., and Kober as applied to claims 1 and 2 above, and further in view of Richter (US Patent No.: 4308479).

For claim 3, the references of Sadarangani et al., Kaneda et al., and Kober teach the claimed invention except for the intermediate member having two secondary magnets. Richter provides a technique of providing magnets (reference numerals 62, 63, see figure 3) in between magnets referenced by numerals 47 and 48 for the purpose of reducing flux leakage (see column 1, lines 45-62), and it would have been obvious for a person of ordinary skill in the art to rearrange the magnets so that two magnets can be placed in between the primary magnets and apply it to the inventions of Sadarangani et al., Kaneda et al. and Kober, since it has been held that rearranging parts of an invention involves only routine skill in the art. *In re Japikse*, 86 USPQ 70.

For claims 4, 6, and 7, Sadarangani et al., Kaneda et al., and Kober disclose the claimed invention except for having the secondary magnets arranged so that the first secondary magnet is in the vicinity of the north pole of the primary magnet of the first

permanent-magnet member and the south pole of the primary magnet of the second permanent-magnet member and so that the second secondary magnet is in the vicinity of the south pole of the primary magnet of the first permanent-magnet member and the north pole of the primary magnet of the second permanent-magnet member (claim 4), the magnetic flux conductors on each side of the primary magnet (claim 6) and the first secondary magnet extending between the first magnetic flux conductor of the two permanent-magnet members and the second secondary magnet extending between the second magnetic flux conductor of the two permanent-magnet members (claim 7). It would have been obvious to have these configurations since this would have involved rearranging the magnets and the magnetic flux conductors (reference numerals 50, 52) illustrated in figure 3 of Richter, and rearranging parts of an invention involves routine skill in the art as explained for claim 3 above.

6. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sadarangani et al., Kaneda et al., Kober, and Richter as applied to claim 3 above, and further in view of Nashiki (US Patent No.: 6211593).

For claim 5, the references of Sadarangani et al., Kaneda et al., Kober, and Richter teach the claimed invention except for the intermediate member having a layer of magnetically insulating material on the secondary magnets. Nashiki uses a similar technique of using magnetic insulating members on the magnetic poles (see column 4, lines 50-65), and it would have been obvious for a person of ordinary skill to apply this

magnetic insulator onto the secondary magnets of the intermediate member for the purpose of preventing demagnetization of the secondary magnets.

Response to Arguments

7. Applicant's arguments with respect to claims 1-21 and 23-29 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following references disclose different embodiments for permanent magnets in magnetized directions: Turner et al. (US 4893040), Hill (US 6043579), Post (US 2003/0006871 A1), Stuart et al. (US 5434458), Kitagawa et al. (JP 04251535 A).

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ALEX W. MOK whose telephone number is (571)272-9084. The examiner can normally be reached on 7:30-5:00 Eastern Time, 1st Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Quyen P. Leung can be reached on (571) 272-8188. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Quyen Leung/
Supervisory Patent Examiner, Art Unit 2834

/A. W. M./
Examiner, Art Unit 2834